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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/574,844	FUNAHASHI, RYOJI	
	Examiner	Art Unit	
	KOURTNEY R. SALZMAN	4128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _06 April 2006_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-18_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-18_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _April 6, 2006 and July 6, 2006_.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Summary

1. This is the first Office Action regarding application number 10/574,844 entitled Conductive Paste For Connecting Thermoelectric Conversion Material, filed April 6, 2006. This is the national stage application of PCT/JP04/14680 filed September 29, 2004, which claims priority from JP 2003-348913.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-7 rejected under 35 U.S.C. 103(a) as being unpatentable over ALEXANDER (US 5,422,190), in view of FUNAHASHI et al (US 6,376,763).

Regarding claims 1 and 4, ALEXANDER teaches a via fill paste for use in electronics. The via fill paste is stated, in column 1, lines 27-30, "to provide an electrical bridge or connection between the conductive layers". In the instant application, the conductive layers are the n-type and p-type semiconductors to be connected via the conductive paste, or in ALEXANDER the fill paste. The fill paste is said to be made of "gold, silver and palladium and a refractory oxide", where the oxide simply comprises one or more of a list of metals including the lanthanides. Column 3, lines 25-42, repeatedly prescribe the use of metal powders in the paste.

While ALEXANDER teaches the combination of powdered metal and oxide to form a conductive paste, more specific lanthanide oxides were not described.

FUNAHASHI et al teaches the composition of a complex oxide as disclosed in the instant application. The complex oxide is shown in the abstract to have the formula $Ca_{3-x}RE_xCo_4O_y$, where the ranges of the variables are $0 \leq x \leq .5$ and $8.5 \leq y \leq 10$. Using these ranges, the subscript of the calcium molecule can occupy the range 2.5 - 3. RE represents the use of a rare earth molecule stated to be any of elements, "Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and

Lu", listed in column 2, lines 53-55, which includes the lanthanide series, as is necessary for comply with the oxide requirements of ALEXANDER. The rare earth subscript can range from 0-.5. The oxygen molecule has the subscript ascribed by the y variable. All the subscript ranges and possible element selections listed are contained within the limitations of claim 1, formula (a). The A^2 element is not required to be present in formula 1 because subscript zero falls within the range designated for variable d of the instant application.

At the time of invention, it would be obvious to use the complex oxide material of FUNAHASHI et al to construct the conductive paste described in ALEXANDER because this composition allows for optimized features of the thermoelectric device. FUNAHASHI et al states in the abstract that the use of this oxide which is composed of "low-toxicity elements, excellent in heat resistance and chemical durability and high in thermoelectric conversion efficiency." These are all highly desirable traits in a thermoelectric device. Therefore, the use of the material described in FUNAHASHI et al as the oxide in the conductive paste of ALEXANDER is obvious because it improves the functional properties of the thermoelectric device, an obvious goal of the thermoelectric industry. ALEXANDER also clearly suggests the use of specific Lanthanide elements to be present in the oxide and the oxide materials provided in FUNAHASHI et al provides Lanthanide-oxides.

Regarding claim 2, in conjunction with the rejection of claim 1 shown above, the amount of refractory oxide present relative to the amount of metallic powder is best shown in the example contained in TABLE 1 of ALEXANDER. If the ratio of parts of oxide per 100 parts of metallic particles is calculated, this example shows approximately 6.57 parts of the refractory oxide is present per 100 parts of metallic oxide. This value is included in the range of the instant application. In the alternative, the amount of metal added to the conductive paste effects the conductivity through electrical components or between the semiconductors. When more metallic material is used in the paste, the easier it becomes for the paste to conduct the electricity through the thermoelectric device. The optimization of the amounts of oxide relative to the amount of metallic material would be determinable through routine experimentation.

Regarding claim 3, in conjunction with the rejection of claim 1 shown above, both a vehicle, or resin of the instant application, and glass binder are used to create a silver paste, as detailed in table II, for example, in column 5, of ALEXANDER. A vehicle is said to be used to produce the paste and is "typically a resin dissolved in a solvent" (column 3, lines 61-63).

Regarding claim 5, the paste composition corresponds exactly to that specified in the rejection of claim 1, explained through ALEXANDER. The powdery oxide described in the instant application also corresponds to the oxide described in

FUNAHASHI et al, as discussed above. The oxide of FUNAHASHI corresponds to the first formula disclosed in claim 5.

Regarding claim 6, in conjunction with the rejection of claim 4 shown above, the amount of refractory oxide present relative to the amount of metallic powder is best shown in the example contained in TABLE 1 of ALEXANDER. If the ratio of parts of oxide per 100 parts of metallic particles is calculated, this example shows approximately 6.57 parts of the refractory oxide is present per 100 parts of metallic oxide. This value is included in the range of the instant application. In the alternative, the amount of metal added to the conductive paste effects the conductivity through electrical components or between the semiconductors. When more metallic material is used in the paste, the easier it becomes for the paste to conduct the electricity through the thermoelectric device. The optimization of the amounts of oxide relative to the amount of metallic material would be determinable through routine experimentation.

Regarding claim 7, in conjunction with the rejection of claim 4 shown above, both a vehicle, or resin of the instant application, and glass binder are used to create a silver paste, as detailed in table II, for example, in column 5. A vehicle is said to be used to produce the paste and is “typically a resin dissolved in a solvent” (column 3, lines 61-63).

6. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over ALEXANDER (US 5,422,190), in view of YOSHIMOTO et al (US 5,352,299).

Regarding claims 8 and 9, ALEXANDER teaches a via fill paste for use in electronics. The via fill paste is stated, in column 1, lines 27-30, "to provide an electrical bridge or connection between the conductive layers". In the instant application, the conductive layers are the n-type and p-type semiconductors to be connected via the conductive paste, or in ALEXANDER the fill paste. The fill paste is said to be made of “gold, silver and palladium and a refractory oxide”, where the oxide simply comprises one or more of a list of metals including the lanthanides. Column 3, lines 25-42, repeatedly prescribe the use of metal powders in the paste.

While ALEXANDER teaches the combination of powdered metal and oxide to form a conductive paste, more specific lanthanide oxides were not described.

YOSHIMOTO et al teaches a semiconductor material as in the instant application, here described as an n-type semiconductor. The complex oxide is shown in the abstract to have the formula $(Ln_{1-x}A_x)_2MO_4$, and is further discussed in great detail in column 2, lines 5-26. The subscripts of each reference variable x which is stated to be in the range of $0.01 \leq x \leq .05$. The Ln stated to be a rare earth element, which in column 2, lines 15-18, is to be one of the group of "yttrium (Y), lanthanum (La), dysprosium (Dy), ytterbium (Yb), and samarium (Sm)". The rare earth element can then as a subscript, per YOSHIMOTO et al, be present in

the compound between .95-.99. The formula element A is stated to be an alkaline earth metal, which in column 2, lines 19-21, is to be one of the group of "calcium (Ca), strontium (Sr) and barium (Ba)" and can be present in quantities ranging from subscripts .01 - .05. The formula element M is stated to be a transition metal element, which in column 2, lines 22-26, is to be one of the group of "copper (Cu), titanium (Ti), iron (Fe), nickel (Ni), zinc (Zn), cobalt (Co), and manganese (Mn)". Here the choice of nickel as the transitional metal creates a compound which corresponds directly to that described as the second oxide of claim 8 and the second oxide described in claim 9. All the subscript ranges and possible element selections listed are contained within the limitations of claims 8 and 9. The R^4 element is not required to be present in formula of claim 9 because subscript zero falls within the range designated for variable v of the instant application.

At the time of invention, it would be obvious to one of ordinary skill in the art to use the composition of the oxide material disclosed in YOSHIMOTO et al as the oxide required in the conductive paste of ALEXANDER because the composition of YOSHIMOTO et al allows for optimized features of the thermoelectric device. In column 2, lines 40-54 of YOSHIMOTO et al, numerous benefits are outlined for low temperature operation, while the advantages of production at a low cost and easy controllability appeal to the entire thermoelectric industry. Therefore, it would be obvious to one of ordinary skill in the art to create the conductive paste disclosed in ALEXANDER and use the oxide disclosed in YOSHIMOTO et al as

the oxide element because the material provides for low cost, highly controlled operation.

Regarding claim 10, in conjunction with the rejection of claim 8 shown above, the amount of refractory oxide present relative to the amount of metallic powder is best shown in the example contained in TABLE 1 of ALEXANDER. If the ratio of parts of oxide per 100 parts of metallic particles is calculated, this example shows approximately 6.57 parts of the refractory oxide is present per 100 parts of metallic oxide. This value is included in the range of the instant application. In the alternative, the amount of metal added to the conductive paste effects the conductivity through electrical components or between the semiconductors. When more metallic material is used in the paste, the easier it becomes for the paste to conduct the electricity through the thermoelectric device. The optimization of the amounts of oxide relative to the amount of metallic material would be determinable through routine experimentation.

Regarding claim 11, in conjunction with the rejection of claim 8 shown above, both a vehicle, or resin of the instant application, and glass binder are used to create a silver paste, as detailed in table II, for example, in column 5. A vehicle is said to be used to produce the paste and is "typically a resin dissolved in a solvent" (column 3, lines 61-63).

7. Claims 12 -14 are rejected under 35 U.S.C. 103(a) as being unpatentable over FUNAHASHI et al (US 6,376,763), in view of YOSHIMOTO et al (US 5,352,299) and ALEXANDER (US 5,422,190).

FUNAHASHI et al teaches the composition of a complex oxide as disclosed in the instant application. FUNAHASHI et al states in column 2, lines 57-60, that the oxide disclosed can also be used to prepare a "p-type thermoelectric material" as in the first limitation of claim 12, where this oxide is said to be used as a p-type thermoelectric material. The complex oxide is shown in the abstract to have the formula $Ca_{3-x}RE_xCo_4O_y$, where the ranges of the variables are $0 \leq x \leq .5$ and $8.5 \leq y \leq 10$. Using these ranges, the subscript of the calcium molecule can occupy the range 2.5 - 3. RE represents the use of a rare earth molecule stated to be any of elements, "Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu", listed in column 2, lines 53-55, which includes the lanthanide series, as is necessary for comply with the oxide requirements of ALEXANDER. The rare earth subscript can range from 0-.5. The oxygen molecule has the subscript ascribed by the y variable. All the subscript ranges and possible element selections listed are contained within the limitations of claim 1, formula (a). The A^2 element is not required to be present in formula 1 of claim 12 because subscript zero falls within the range designated for variable d of the instant application.

FUNAHASHI fails to teach an n-type thermoelectric material and the use of the oxide described above as part of a conductive paste.

YOSHIMOTO et al teaches a semiconductor material as in the instant application, here described as an n-type semiconductor in column 2, lines 48-52. The complex oxide is shown in the abstract to have the formula $(Ln_{1-x}A_x)_2MO_4$, and is further discussed in great detail in column 2, lines 5-26. The subscripts of each reference variable x which is stated to be in the range of $0.01 \leq x \leq .05$. The Ln stated to be a rare earth element, which in column 2, lines 15-18, is to be one of the group of "yttrium (Y), lanthanum (La), dysprosium (Dy), ytterbium (Yb), and samarium (Sm)". The rare earth element can then as a subscript, per YOSHIMOTO et al, be present in the compound between .95-.99. The formula element A is stated to be an alkaline earth metal, which in column 2, lines 19-21, is to be one of the group of "calcium (Ca), strontium (Sr) and barium (Ba)" and can be present in quantities ranging from subscripts .01 - .05. The formula element M is stated to be a transition metal element, which in column 2, lines 22-26, is to be one of the group of "copper (Cu), titanium (Ti), iron (Fe), nickel (Ni), zinc (Zn), cobalt (Co), and manganese (Mn)". Here the choice of nickel as the transitional metal creates a compound which corresponds directly to that described as the second oxide of n-type semiconductor formulas in claim 12. All the subscript ranges and possible element selections listed are contained within the limitations of claim 12. The R^4 element is not required to be present in formula of claim 12 because subscript zero falls within the range designated for variable v of the instant application.

At the time of invention, it would have been obvious to one of ordinary skill in the art to choose the p-type and n-type oxides disclosed in FUNAHASHI et al and YOSHIMOTO et al in the same thermoelectric device because both compositions allow for optimized features of the thermoelectric device. FUNAHASHI et al states in the abstract that the use of this oxide which is composed of "low-toxicity elements, excellent in heat resistance and chemical durability and high in thermoelectric conversion efficiency." In column 2, lines 40-54 of YOSHIMOTO et al, numerous benefits are outlined for low temperature operation, while the advantages of production at a low cost and easy controllability appeal to the entire thermoelectric industry. Therefore, it would be obvious to one of ordinary skill in the art to combine the thermoelectric materials disclosed in FUNAHASHI et al and YOSHIMOTO et al because both seek to produce efficient, quality operation.

The combination of materials disclosed in FUNAHASHI et al and YOSHIMOTO et al fails to disclose the composition of a conductive paste or the use of the oxide powders in the paste.

ALEXANDER, with the oxide disclosed in FUNAHASHI et al, create the paste described in claim 1, as seen in the above rejection of claim 1. It is obvious to use the oxide disclosed in FUNAHASHI et al, as the oxide required by ALEXANDER to make the conductive paste described because it fits the requirements including containing a lanthanide element, while optimizing many ideal features of the

thermoelectric device. FUNAHASHI et al states in the abstract that the use of this oxide which is composed of "low-toxicity elements, excellent in heat resistance and chemical durability and high in thermoelectric conversion efficiency." These are all highly desirable traits in a thermoelectric device. Therefore, the use of the material described in FUNAHASHI et al as the oxide in the conductive paste of ALEXANDER is obvious because it improves the functional conduction properties of the paste for a secure adhesion to the conductive substrate, an obvious goal of the thermoelectric industry. ALEXANDER also clearly suggests the use of specific Lanthanide elements to be present in the oxide and the oxide materials provided in FUNAHASHI et al provides Lanthanide-oxides.

Regarding claims 13 and 14, FUNAHASHI et al teaches the composition of a complex oxide as disclosed in the instant application. FUNAHASHI et al states in column 2, lines 57-60, that the oxide disclosed can also be used to prepare a "p-type thermoelectric material" as in the first limitation of claims 13 and 14, where this oxide is said to be used as a p-type thermoelectric material. The complex oxide is shown in the abstract to have the formula $Ca_{3-x}RE_xCo_4O_y$, where the ranges of the variables are $0 \leq x \leq .5$ and $8.5 \leq y \leq 10$. Using these ranges, the subscript of the calcium molecule can occupy the range 2.5 - 3. RE represents the use of a rare earth molecule stated to be any of elements, "Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu", listed in column 2, lines 53-55.

The rare earth subscript can range from 0-.5. The oxygen molecule has the subscript ascribed by the y variable. All the subscript ranges and possible element selections listed are contained within the limitations of claim 13, as the first formula for both the composition of the oxide in the p-type thermoelectric material and in the p-type conductive paste. The A^2 element is not required to be present to fulfill the limitations of claim 14 because the subscript zero falls within the range designated for variable d of the instant application.

FUNAHASHI fails to teach an n-type thermoelectric material and the use of the oxide described above as part of a conductive paste.

YOSHIMOTO et al teaches a thermoelectric material as in the instant application, which can be used as an n-type semiconductor as described in column 2, lines 48-52. The complex oxide is shown in the abstract to have the formula $(Ln_{1-x}A_x)_2MO_4$, and is further discussed in great detail in column 2, lines 5-26. The subscripts of each reference variable x which is stated to be in the range of $0.01 \leq x \leq .05$. The Ln stated to be a rare earth element, which in column 2, lines 15-18, is to be one of the group of "yttrium (Y), lanthanum (La), dysprosium (Dy), ytterbium (Yb), and samarium (Sm)". The rare earth element can then as a subscript, per YOSHIMOTO et al, be present in the compound between .95-.99. The formula element A is stated to be an alkaline earth metal, which in column 2, lines 19-21, is to be one of the group of "calcium (Ca), strontium (Sr) and barium (Ba)" and can be present in quantities ranging from subscripts .01 - .05. The

formula element M is stated to be a transition metal element, which in column 2, lines 22-26, is to be one of the group of "copper (Cu), titanium (Ti), iron (Fe), nickel (Ni), zinc (Zn), cobalt (Co), and manganese (Mn)". Here the choice of nickel as the transitional metal creates a compound which corresponds directly to that described as the second oxide of n-type semiconductor formulas in claim 13, the second oxide of the n-type paste formulas in claim 13, the second oxide of the n-type thermoelectric formulas in claim 14 and the second oxide of the n-type paste formulas in claim 14. All the subscript ranges and possible element selections listed are contained within the limitations of claim 14. The R^4 element is not required to be present in formula of claim 14 because subscript zero falls within the range designated for variable v of the instant application.

At the time of invention, it would have been obvious to one of ordinary skill in the art to choose the p-type and n-type oxides disclosed in FUNAHASHI et al and YOSHIMOTO et al in the same thermoelectric device because both compositions allow for optimized features of the thermoelectric device. FUNAHASHI et al states in the abstract that the use of this oxide which is composed of "low-toxicity elements, excellent in heat resistance and chemical durability and high in thermoelectric conversion efficiency." In column 2, lines 40-54 of YOSHIMOTO et al, numerous benefits are outlined for low temperature operation, while the advantages of production at a low cost and easy controllability appeal to the entire thermoelectric industry. Therefore, it would be obvious to one of ordinary skill in the art to combine the thermoelectric materials disclosed in FUNAHASHI

et al and YOSHIMOTO et al because both seek to produce efficient, quality operation.

The combination of materials disclosed in FUNAHASHI et al and YOSHIMOTO et al fails to disclose the composition of a conductive paste or the use of the oxide powders in the two different paste formulations.

ALEXANDER teaches a via fill paste for use in electronics. The via fill paste is stated, in column 1, lines 27-30, "to provide an electrical bridge or connection between the conductive layers", as in the conductive paste of the instant claim. In the instant application, the conductive layers are the n-type and p-type semiconductors to be connected via a conductive paste of each type, or in ALEXANDER the fill paste. The fill paste is said to be made of "gold, silver and palladium and a refractory oxide", where the oxide simply comprises one or more of a list of metals including the lanthanides. Column 3, lines 25-42, repeatedly prescribe the use of metal powders in the paste. ALEXANDER, with the oxide disclosed in FUNAHASHI et al, create the p-type paste with the limitations of claims 13 and 14. ALEXANDER, with the oxide disclosed in YOSHIMOTO et al, create the n-type paste with the limitations of claims 13 and 14.

It is obvious to use the oxides disclosed in FUNAHASHI et al and YOSHIMOTO et al, as the oxide required by ALEXANDER to make the conductive paste described because it fits the requirements including containing a lanthanide

element, while optimizing many ideal features of the thermoelectric device. FUNAHASHI et al states in the abstract that the use of this oxide which is composed of "low-toxicity elements, excellent in heat resistance and chemical durability and high in thermoelectric conversion efficiency." In column 2, lines 40-54 of YOSHIMOTO et al, numerous benefits are outlined for low temperature operation, while the advantages of production at a low cost and easy controllability appeal to the entire thermoelectric industry. These are all highly desirable traits in a thermoelectric device. Therefore, the use of the materials described in FUNAHASHI et al and YOSHIMOTO et al as the oxide in the conductive paste of ALEXANDER is obvious because it improves the functional properties of the thermoelectric device, an obvious goal of the thermoelectric industry, while still fulfilling the requirements of an oxide described in ALEXANDER. ALEXANDER also clearly suggests the use of specific Lanthanide elements to be present in the oxide and the oxide materials provided in FUNAHASHI et al and YOSHIMOTO et al provides Lanthanide-oxides.

8. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over FUNAHASHI et al (US 6,376,763) and YOSHIMOTO et al (US 5,352,299) and ALEXANDER (US 5,422,190) as applied to claim 12 above, and further in view of BUIST (US 4,859,250).

The previous rejections of claims 1 and 12 meet the limitations of these claims.

The combination of the materials disclosed in FUNAHASHI et al and YOSHIMOTO et al, connected with the paste disclosed in ALEXANDER, fails to disclose the location of the thermoelectric components in the thermoelectric device.

Regarding claim 15, in conjunction with the previous rejections of claims 1 and 12, BUIST teaches in figure 3A the location and connection of p-type and n-type semiconductors. The semiconductors are shown to be attached to a substrate, reference number 24, as described in the column 4 line 14- 45 description of the figure. The thermoelectric element includes the n-type conductor (reference number 64), p-type conductor (reference number 66) and connection between the two (reference number 82). Each element is shown connected in series. The unconnected end of the p-type semiconductor is electrically connected to the unconnected end of the n-type semiconductor using lead, reference number 80. This is method of connection is conventional to one of ordinary skill in this art. Therefore, the connection of an n-type and p-type semiconductor via an unconnected end would be obvious.

Regarding claim 16, in conjunction with the previous rejections of claims 1, 12 and 15, BUIST utilizes the configuration of thermoelectric elements, as in the rejection of claim 15, shown in figure 3A, and forms the elements into strips affixed to the flexible plastic substrate. In column 5, lines 5-8, BUIST teaches, "the thermoelectric elements are folded to combine all cold strings on a first

plane and all hot strips on a second plant opposing the first plane of cold strips". Shown in figure 4, the hot side is compiled on one end of the modulus, while the cold side s complied opposite.

At the time of invention, one of ordinary skill in the art would find it obvious to organize the combination of the materials disclosed in FUNAHASHI et al, YOSHIMOTO et al and ALEXANDER in the manner of BUIST because the layout of similar temperature elements on opposing sides is obvious. It is intuitive to place the cold strip elements on one side of the thermoelectric modulus and the hot elements on the other because a thermoelectric device is usually used to generate power from a temperature gradient on two different sides of the device. The organization of the elements taught by FUNAHASHI et al, YOSHIMOTO et al and ALEXANDER in the pattern of BUIST is obvious as it allows the thermoelectric device to function efficiently.

9. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over FUNAHASHI et al (US 6,376,763) and YOSHIMOTO et al (US 5,352,299) and ALEXANDER (US 5,422,190) as applied to claim 13 above, and further in view of BUIST (US 4,859,250).

The previous rejection of claim 13 meets the limitations of these claims.

The combination of the materials disclosed in FUNAHASHI et al and YOSHIMOTO et al, connected with the paste disclosed in ALEXANDER, fails to disclose the location of the thermoelectric components in the thermoelectric device.

Regarding claim 17, in conjunction with the previous rejection of claims 13, BUIST teaches in figure 3A the location and connection of p-type and n-type semiconductors. The semiconductors are shown to be attached to a substrate, reference number 24, as described in the column 4 line 14- 45 description of the figure. The thermoelectric element includes the n-type conductor (reference number 64), p-type conductor (reference number 66) and connection between the two (reference number 82). Each element is shown connected in series. The unconnected end of the p-type semiconductor is electrically connected to the unconnected end of the n-type semiconductor using lead, reference number 80. This is method of connection is conventional to one of ordinary skill in this art. Therefore, the connection of an n-type and p-type semiconductor via an unconnected end would be obvious.

Regarding claim 18, in conjunction with the previous rejections of claims 13 and 17, BUIST utilizes the configuration of thermoelectric elements, as in the rejection of claim 15, shown in figure 3A, and forms the elements into strips affixed to the flexible plastic substrate. In column 5, lines 5-8, BUIST teaches, "the thermoelectric elements are folded to combine all cold strings on a first

plane and all hot strips on a second plant opposing the first plane of cold strips". Shown in figure 4, the hot side is compiled on one end of the modulus, while the cold side s complied opposite.

At the time of invention, one of ordinary skill in the art would find it obvious to organize the combination of the materials disclosed in FUNAHASHI et al, YOSHIMOTO et al and ALEXANDER in the manner of BUIST because the layout of similar temperature elements on opposing sides is obvious. It is intuitive to place the cold strip elements on one side of the thermoelectric modulus and the hot elements on the other because a thermoelectric device is usually used to generate power from a temperature gradient on two different sides of the device. The organization of the elements taught by FUNAHASHI et al, YOSHIMOTO et al and ALEXANDER in the pattern of BUIST is obvious as it allows the thermoelectric device to function efficiently.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KOURTNEY R. SALZMAN whose telephone number is (571)270-5117. The examiner can normally be reached on Monday to Friday 7AM to 4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barbara Gilliam can be reached on (571) 272-1330. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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